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Wastewater Lagoons Remedial Action Work Plan Revision 1

UOP Site
East Rutherford, New Jersey

Prepared for:

UOP, Incorporated
Des Plaines, Illinois

February 1987

ERT®
A RESOURCE ENGINEERING COMPANY

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1. INTRODUCTION

This document describes the work plan for removal of contaminated materials in the two wastewater lagoons described as Area 3 of the UOP site, East Rutherford, NJ. This submittal of the work plan is identified as Revision 1; the original plan was submitted in September 1986. Revision 1 incorporates comments received from the NJDEP on December 5, 1986. This Work Plan was prepared as a requirement of the overall site Work Plan, (September 1986).

1.1 Site/Lagoon Background

The UOP site is located in East Rutherford, New Jersey near the intersection of State Routes 17 and 20. The site was initially developed in 1932 by Trubeck Laboratories. The two wastewater sludge lagoons were built by Trubeck in 1959 and received wastewater sludge until approximately 1971 when the plant was connected to the municipal sewer system. In 1979, UOP, Inc. decided to terminate operations and dismantle the plant. Demolition work was accomplished during the summer of 1980.

Previous investigations show that the lagoons consist of a sludge deposit underlain by meadow mat or peat which is underlain by saturated clay. The contamination in the lagoons consists of Volatile Organic Compounds (up to 600 mg/kg), Base/Neutral Extractable Organic Compounds (up to 200 mg/kg), Acid-Extractable Organic Compounds (up to 20 mg/kg) and small quantities of chromium and cyanide. The results of these investigations are summarized in the report entitled "Phase II Investigation, Water and Soil Conditions, UOP Site, E. Rutherford, NJ."

Evaluations of remedial action alternatives performed in May 1986 for the lagoons indicated that excavation and removal of contaminated materials to an off-site disposal facility was the most feasible. In a June 9, 1986 letter to the NJDEP, UOP

committed to implementing this remedial action alternative based on information available at that time. In an August 13, 1986 letter, the NJDEP authorized the preparation of this Remedial Action Work Plan.

1.2 General Description of Excavation and Removal

The complete details of the excavation are contained in the subsequent sections of this work plan. However, to aid in understanding the operation, a summary description of the program is provided here.

A series of initial tests and studies (including a risk assessment) will provide a definition of the horizontal and vertical extents of the excavation in both lagoons, determine the amount of stabilizing material needed to meet disposal requirements, and other related operational parameters. Following these tests, the excavation and removal program will begin.

At the start of the remedial program an impermeable staging area surrounded by a low berm will be constructed adjacent to the west side of the lagoons. The staging area will contain:

- a concrete mixing pad for stabilizing the sludge/soil,
- sump water collection facilities, and
- a concrete decontamination pad.

A backhoe or front end loader will be used to excavate contaminated materials. Excavated materials will be transported from the lagoons by truck and dumped onto the mixing pad. Cement kiln dust will be added at a pre-determined ratio from a nearby hopper and mixed into the sludge/soil. The stabilized mixture will be loaded by a payloader into a 20-cubic-yard rolloff container adjacent to the mixing pad. The rolloff container will then be loaded onto a

truck-trailer. The truck-trailer will be cleaned on the decontamination pad immediately before departing the staging area. All water on the pads, and in the staging area will be collected in sumps and pumped to a storage tank located in the staging area.

The excavation of sludge/soil from the lagoons will proceed as follows:

1. The lagoons will be conceptually subdivided into 16 cells.
2. Each cell will be excavated and then backfilled with crushed stone before the next cell is excavated.
3. The sequence in which the cells will be excavated reduces the possibility of recontamination of previously backfilled cells during dump truck loading.
4. An access road will be built into the lagoons as excavation progresses to facilitate the loading process.
5. Backfilled cells will be used as the equipment platform from which other cells will be excavated.

Following excavation and backfilling, all the equipment and materials contained onsite will either be removed and disposed of as hazardous materials or decontaminated and removed from the site.

2. IDENTIFICATION OF EXCAVATION BOUNDARIES AND RELATED INVESTIGATIONS

The excavation program requires a clear definition of the lateral and vertical extent of excavation prior to initiating work. This section describes the existing available data and the additional data needed to fully define the boundaries of the excavation. The available data provide an adequate basis to perform a health risk assessment which will help define the depth of excavation, referred to here as the vertical limit of excavation.

Less is known about the horizontal extent of contamination into the berms and the safe limit for excavating without impacting the berms' stability. An investigation program is described which will determine these factors and aid in defining the horizontal limit of excavation. The investigations include:

- sampling and analysis of berm soils for lagoon contaminants,
- trench tests to determine: the horizontal extent of contamination, the hydrogeologic characteristics of the lagoons and berms, and the stability of the berms under excavated conditions,
- soil strength tests of berm soils to determine the stability of berm slopes, and
- sludge/soil stabilization tests to determine the optimum quantity of stabilizing material to eliminate free liquids from the material.
- The health risk assessment will also ensure that the horizontal limit of excavation adequately provides for the public's health and safety.

2.1 Excavation Boundaries

2.1.1 Vertical Limit of Excavation

The wastewater lagoons are generally characterized by three soil strata: a top layer of sludge (approximately 2 feet thick), a middle layer of meadow mat (approximately 2 feet thick) and an underlying layer of clay, (Ref. Phase II Report). The Phase II Report provides contaminant concentration data in all three of these layers. The Phase II data provides sufficient data to perform the Health Risk Assessment described in Section 2.1.3. Consequently, no further field investigations are required to define the vertical limit of excavation.

2.1.2 Horizontal Limit of Excavation

The horizontal limit of excavation will depend on the existing contaminant conditions in the berms, the cleanup objectives established by the risk assessment and the stability of the berms under excavated conditions. A trench test program described in Section 2.2 is planned in order to obtain information visually about the lateral extent of contamination and the berms' stability under excavated conditions. In addition, soil samples will be obtained during the trench tests on which laboratory strength tests will be run to analytically determine the berms' stability. A soil sampling program described in Section 2.3 is planned in order to define the contaminant distribution in the berms.

The contaminant distribution found in the berms and the cleanup objectives established by the risk assessment will be used together to define the required horizontal limit of excavation. The stability analyses will indicate, with an appropriate factor of safety, whether or not the horizontal limit of excavation will adversely affect the berms' stability and require special handling during the excavation.

In contemplating the scenario in which the horizontal limit of excavation will adversely affect the berms' stability, the following cleanup approach is planned:

- Excavate horizontally as far as possible without compromising the berms' integrity.
- Backfill to restore the original berm profile to ensure long-term berm stability.
- Address the remaining contamination in the berms when the Area 4 stream channel sediments are remediated. This could mean that all or part of the remaining original berms would be removed when Area 4 is remediated.

This approach will accomplish the majority of the cleanup during lagoon remediation and complete the cleanup during the stream channel remediation. It avoids the difficult and risky use of sheet piling near the stream channels that other alternatives would use. In addition to the problems of installation, sheet piling retards but does not eliminate water flow. Significant seepage could occur through the sheet pile joints during a high tide. This could cause a significant flow into the lagoon excavation which would not be protected by the berms.

2.1.3 Health Risk Assessment

The Health Risk Assessment will be used to define cleanup objectives and subsequently the physical limits of the excavation.

The Risk Assessment will initially consider the impact of the wastewater lagoons in their existing condition. Assuming this present condition poses unacceptable risks, then the risk assessment process will be used to establish cleanup objectives, i.e., safe levels of contaminants in unremoved soils.

The risk assessment establishes the cleanup objectives by calculating a safe concentration limit for the receptor organism (human or animal) and back-computing the equivalent contaminant concentrations in the unremoved soils. The cleanup objectives would then be achieved by excavating vertically into the sludge and soil and horizontally into the berms until the residual concentrations fall below the objectives.

The risk assessment will be implemented in accordance with the NJDEP document, "Draft Risk Assessment Guidelines for Hazardous Waste Sites," NJDEP Division of Hazardous Site Mitigation, November 1986. The risk assessment process recommended by this document contains the following steps:

1) Selection of chemicals
2) Preparation of toxicity and environmental profiles
3) Identification and development of exposure pathways
4) Identification and characterization of potentially exposed populations
5) Estimation of environmental concentrations
6) Comparison of environmental concentration to relevant and applicable standards
7) Calculation of dose
8) Estimation of risk
9) Presentation of risk
10) Uncertainty analysis
11) Discussion and findings

This process is very similar to U.S. EPA guidance on risk assessments and is primarily a detailed description of the EPA's four step approach:

1) Hazard Identification
2) Dose Response Assessment
3) Exposure Assessment
4) Risk Characterization

The Risk Assessment findings will be submitted to the NJDEP and it is anticipated that the submittal will be followed by a NJDEP review, UOP revision and NJDEP approval cycle.

2.2 Trench Tests

For this activity, a track-mounted backhoe will excavate four trenches. The trenches will be approximately two feet wide and ten feet long at the locations indicated in Figure 2-1. Trenches adjacent to the berms will allow visual observations of the lateral extent of the sludge deposits. These observations, used in conjunction with the soil boring data (Section 2.3) will provide a detailed description of lateral contamination. These perimeter trenches will also provide an indication of the berms' stability under excavated conditions and the hydrogeologic conditions in and near the berms. Trenches in the lagoons' mid-sections will give indications of the physical make-up and water content of the contaminated and underlying materials.

Soil and sludge samples will be collected from the trenches for stabilization and soils strength tests as described in Sections 2.4 and 2.5. The procedures for collecting these samples is described in Appendix Section A1.

If undisturbed soil samples for the laboratory soils strength tests cannot be obtained, then in situ shear strength tests may be performed in the trenches as described in Section 2.5.2.

2.3 Soil Sampling

2.3.1 Sampling Plan

A soil sampling program will determine the lateral extent of contamination along the lagoon's perimeter. Four transects of four borings each and one transect of five borings will be established along the lagoons' berms at the locations shown on

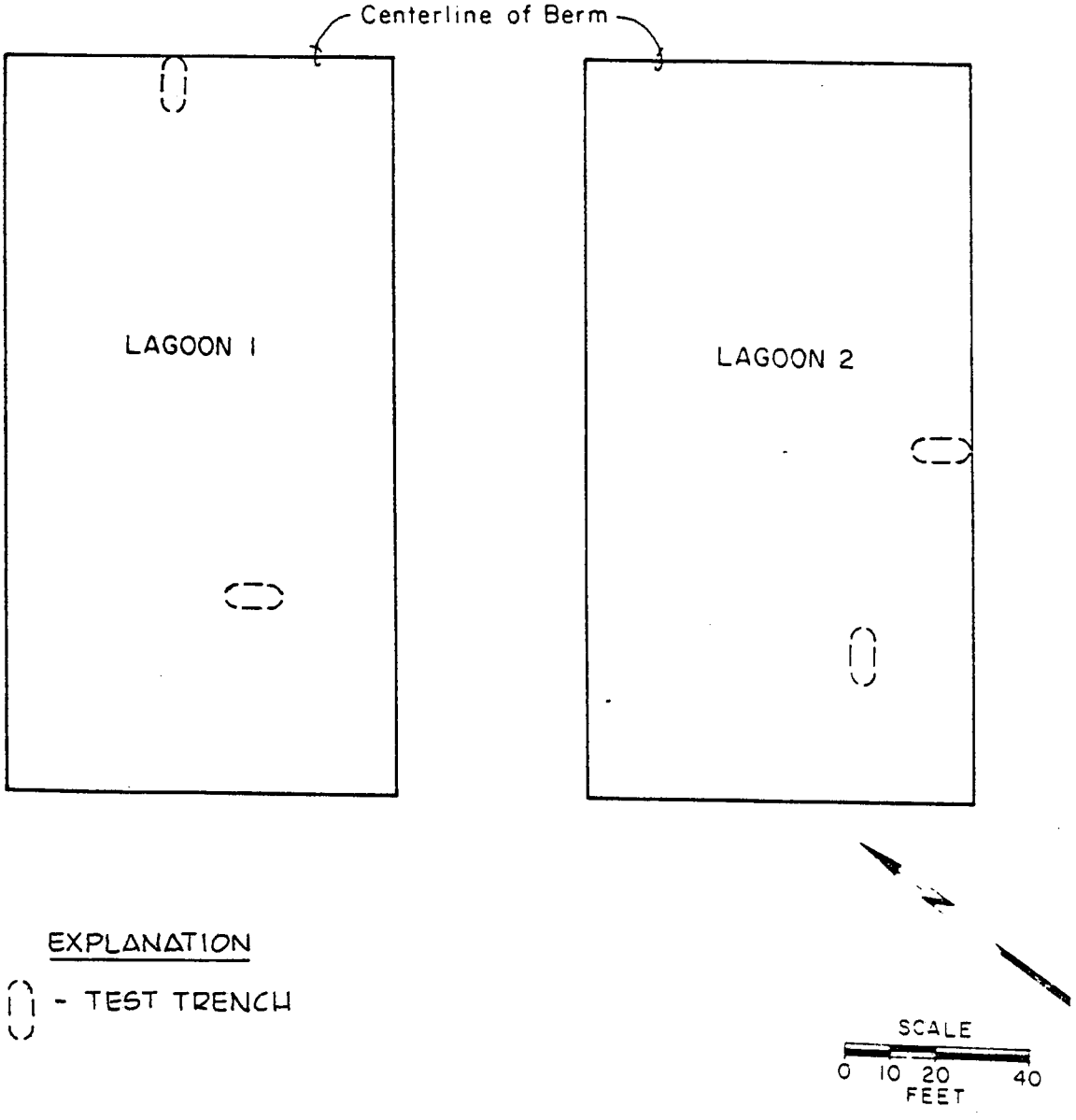


Figure 2-1 Locations of Test Trenches in Wastewater Lagoons, UOP, Inc., East Rutherford, NJ

Figure 2-2. Transect 1-1 is located on the northwest side of Lagoon 1. Data from Transect 1-1 will describe the lateral extent of contamination into the soil towards the railroad tracks. Transects 2-2, 3-3 and 4-4 are located along the three sides of the lagoons that are adjacent to stream channels. Figure 2-3 shows a typical four-boring transect through the berm. Data from these transects will represent contaminant migration in the hydrogeologic regime that exists along the three sides of the lagoons. Transect 5-5 will describe contaminant concentrations through the dividing berm between Lagoons 1 and 2.

The soil borings will be hand augered to a subsurface elevation equal to the depth of samples taken from the clay layer for the Phase II investigation. The deepest of the Phase II investigation boring samples was seven feet below the lagoon surface. The ability to obtain samples at this depth is subject to the soil properties and the limitations of the hand auger. Three one-foot composite samples will be taken from each boring; one from the unsaturated peat, one from the soil directly above the peat and one from the saturated soil beneath the peat. The sampling procedures and the field quality assurance requirements for these borings are described in Appendix A.

2.3.2 Analytical Requirements

The Phase II investigation showed VOCs to be the most abundant and widespread class of contaminant within the lagoons. Therefore VOC analyses will be used to identify the presence of contaminants in the area of the berms. The berm samples will be analyzed at the ERCO laboratory using GC/MS Analyses.

The following analytical protocol is required for the volatile organics analyses:

- 80 percent of the volatile organic analyses will be analyzed by EPA Method 8240, and

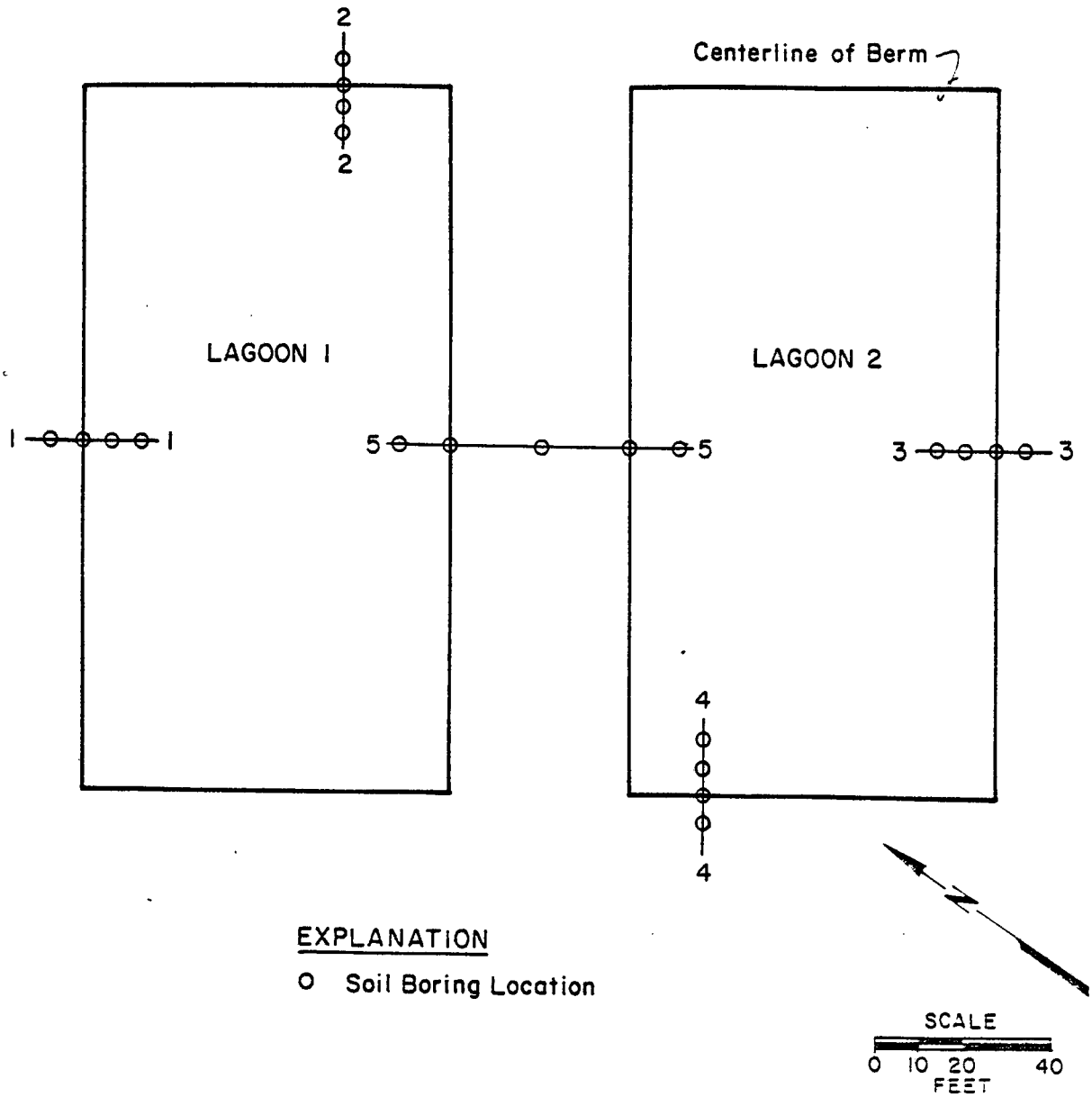
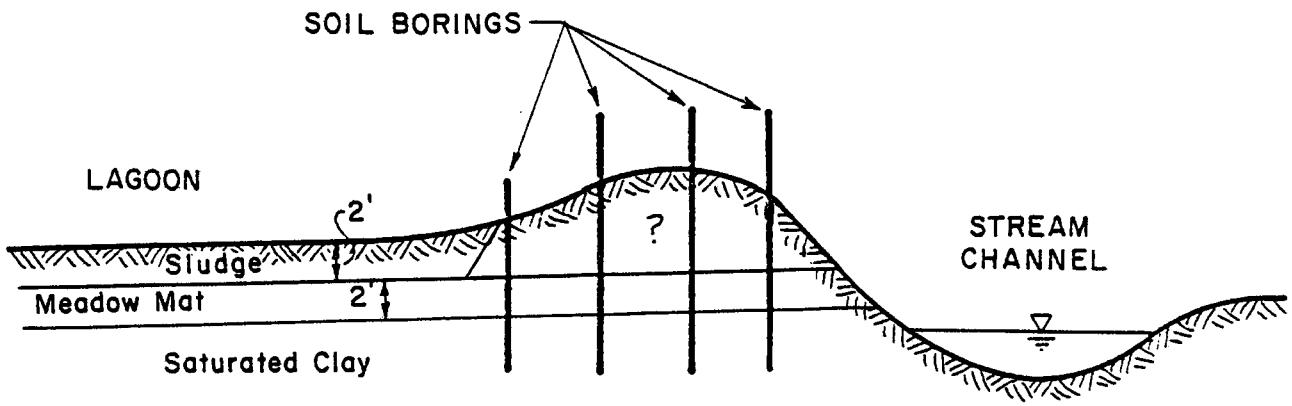


Figure 2-2 Locations of Sampling Transects around Perimeter of Wastewater Lagoons, UOP, Inc., East Rutherford, NJ



Not to Scale

Figure 2-3 Typical Soil Boring Transect Across Lagoon Berms

- 20 percent of the volatile organic analyses will be analyzed according to New Jersey Tier II protocols.

The 20 percent of samples to be analyzed by Tier II protocols will be distributed among the five transects and chosen randomly from each transect.

These analytical requirements provide adequate quality assurance since the lagoon contaminants are well known from and described in the Phase II investigation.

2.4 Sludge/Soil Stabilization

This section describes the laboratory program required to determine the amount and type of stabilization material (most likely cement kiln dust) needed to remove free liquids from and stabilize the excavated material.

Laboratory Analysis

Representative samples of the lagoon materials will be collected during the trench testing. In the laboratory, the water content of these samples will be determined. The samples will then be mixed with various amounts of cement kiln dust (calcium silicate based compound) and subjected to the Paint Filter Liquids Test (EPA Method 9095). A relationship between liquid content and amount of stabilizing material required to pass the test and to be acceptable for landfill disposal will be established. This relationship will then be extrapolated to field conditions under the pilot study described in Section 5.2.

2.5 Berm Stability Investigations

In order to evaluate the berm stability under excavated and backfilled conditions, the water table elevation in the berms and the permeability and soil strength characteristics of berm soils must be known. The water table elevation in the berms will be described during the trench tests (Section 2.2).

An attempt will be made to collect soil samples (during the trench tests) for permeability and soil strength tests performed in the laboratory. Section 2.5.1 describes the plan for collecting berm soil samples during the trench tests and for analyzing these samples in the laboratory.

If the berm material is of such a consistency that intact samples cannot be obtained during the trench tests, then field permeability and strength tests will be performed instead of laboratory testing. Section 2.5.2 describes the plan for these field tests. The data developed on water table elevation, permeability and shear strength along with the berms' cross-sectional configuration will be input into a computer program that utilizes the simplified Bishop method for analyzing the stability of dikes, berms and slopes. Several different failure surfaces will be analyzed using this method to determine the stability of the diked material. The dike will be analyzed for stability in the long-term condition after backfilling has occurred, and in the short-term condition with the existing lagoon sludge material removed. This second analysis will be similar to a rapid drawdown analysis that is performed on earth dams.

2.5.1 Permeability and Soil Strength Tests Performed in the Laboratory

Soil samples collected during the trench tests will arrive at the soils testing laboratory in sealed Shelby Tubes as described in Sections 2.2 and A1. The laboratory will test the samples for moisture content, dry density, Atterberg limits, permeability, and drained and undrained shear strength characteristics.

2.5.2 Permeability and Soil Strength Tests Performed in the Field

The field permeability test will be performed using the slug test procedure. The slug test involves driving piezometers into the soil to a depth of approximately 10 feet.

The driving of the piezometers will be accomplished using either hand-held sledge hammers or mechanized fence post drivers. Ten piezometers will be installed at constant intervals in the crest of the three exterior berms that border Ackerman's Creek.

Once the piezometers are in place, a slug test will be performed by filling the piezometers with water and then measuring the length of time required for the water level to drop. From these measurements, the permeability of the berm soils will be estimated.

Field shear strength tests will be performed by using hand-held cone penetrometer devices or hand operated tourvane systems. The cone penetrometer measures the resistance of the soil to a cone shaped device penetrating approximately 1 inch into the soil. The tourvane measures the shear resistance of the soil to the twisting of a four-bladed device in the soil. Both types of systems come with expandable handles so that depths to about eight feet can be easily achieved. If depths greater than eight feet are required, then the shear tests will be performed during the trench tests. The backhoe will excavate the upper three to four feet of soil after the shear test is performed. By excavating in three- to four- foot increments, depths to approximately 12 feet can be obtained; provided that the inflow of groundwater does not hault the excavation process.

2.6 Topographic Survey

A survey will be taken of the two lagoons in order to define the pre-excavation topography. Because dense vegetation prevents an accurate aerial survey, land surveying methods will be utilized. Several transects will be taken across the two lagoons at close enough spacing to adequately define the lagoons interior areas and the perimeter berms. Mapping of the data will be done at one-half foot contour intervals.

Elevations will be referenced to the National Geodetic Vertical Datum (NGVD) and tied into a nearby United States Geologic Survey (USGS) bench mark. Horizontal control points will be referenced to on-site landmarks.

3. CONTRACTOR SELECTION

UOP intends to proceed with a formal solicitation of hazardous waste contractors for implementation of the excavation, transportation and disposal program. A firm that is qualified to carry out both the excavation and transportation activities will be sought. The selected firm will also be required to arrange for the installation of site utilities, provide office facilities for UOP and ERT, institute a health and safety program in accordance with this work plan, and provide other miscellaneous support services for the excavation program.

The contractor selection process will consist of the following steps:

- Prepare technical specifications,
- Assemble bid package,
- Solicit bids,
- Review contractor proposals,
- Select contractor, and
- Negotiate contract.

Proposals will be solicited from approximately four competent contractors licensed to operate in New Jersey.

4. DESIGN/CONSTRUCTION FEATURES

4.1 General Site Layout

The proposed layout for the sludge/soil removal is indicated on Drawing 1. As shown in Drawing 1, the major features of the site are the Equipment Storage/Site Services Area and the Staging Area. These areas are respectively to the North and West of the two lagoons. The Equipment Storage/Site Services Area will be the location for all office trailers, equipment storage, parking, and sanitation facilities. This area will be a non-contained area (i.e., will not be protected by any kind of liner system or containment dikes). The Staging Area is the location in which the stabilization of the lagoon sludges will occur. This area is a contained area and will be protected by high density polyethylene liner and a dike system as shown on Drawing 2.

4.2 Site Preparation

Since the staging area will be protected by a high density polyethylene liner (HDPE), it will be necessary to properly prepare the subgrade. All rocks, pieces of metal, wood, and any other debris larger than 3/4" in diameter will be removed from this area prior to placement of the HDPE liner. The ground within the diked staging area will be graded to slope to the inlet as shown on Drawing 2. The Equipment Storage/Site Services Area will be graded to allow proper surface water drainage to Ackerman's Creek.

4.3 Equipment Storage/Site Services Area

This area is located north of the channel in an unrestricted portion of the site. By unrestricted, it is inferred that the stormwater leaving this area does not need to

be contained for treatment. This area will include all office trailers and communications equipment, sanitation facilities, possible wastewater treatment facilities, and employee parking. This area is shown on Drawing 1.

4.4 Staging Area

The layout of the staging area is as indicated on Drawing 2. The primary components of this area are the access road, the mixing pad, the decontamination pad, the containment dikes, the cement kiln dust hopper, and the sump water storage tank. This area will be lined with a high density polyethylene liner which will be covered with a twelve-inch layer of gravel. The staging area will be surrounded with containment dikes that will prevent stormwater runon and runoff to and from the staging area.

4.5 Roads

An access road will be constructed as indicated on Drawing 1. The construction of this road will allow for a smooth operation without undue congestion in the staging area. The road setup allows for one way travel of vehicles through the staging area. The road within the staging area will be within the contained system and will be constructed over the HDPE liner as shown on Drawings 2 and 3.

4.6 Railroad Crossings

The use of two at-grade railroad crossings is planned for the excavation program. The location of these crossings is shown on Drawing 1. The northern-most crossing is an existing, signaled crossing having signal lights, bells and crossing gates. The crossing is presently unusable; the approaches were excavated and eliminated during tie and rail replacement in the summer of 1986. UOP maintains a lease agreement on this crossing and accordingly, the railroad owner, NJ Transit Corp., has indicated its intention to rebuild the crossing.

The southern-most crossing has not yet been established. The procedure for establishing a temporary at-grade construction crossing has been initiated with the NJ Transit Corp. UOP will take further action after the NJ Transit Corp. provides details of their requirements for establishing this particular crossing.

4.7 Utilities

Telephone and electrical service will be routed to the site. Water for the decontamination pad will be brought in by tank truck.

4.8 Permits

All federal, state and local permits and licenses necessary to undertake the specified work will be obtained. Permits that are likely to be required include the following:

- New Jersey Pollutant Discharge Elimination System; Discharge to Surface Water Permit required for discharge of lagoon sump water to Ackerman's Creek.
- New Jersey Pollution Discharge Elimination System; Significant Industrial User Permit required for discharge to the Rutherford, East Rutherford, Carlstadt Joint Meeting (RERCJM) treatment works.
- Industrial Wastewater Discharge Permit; required for discharge to RERCJM treatment works.
- U.S. Army Corps of Engineers Section 404 Permit; Required for construction activities in wetlands.
- N.J. Division of Coastal Resources Wetlands Permit; Required for any project that affects wetlands areas.
- N.J. Division of Coastal Resources Waterfront Development Permit; Necessary for projects involving waterfront development of coastal areas.

- Division of Flood Plain Management Stream Encroachment Permit; Necessary to show that the project will not adversely affect flood levels in the site vicinity.
- Hackensack Meadowlands Development Commission; required permit to be determined.
- N.J. Bureau of Tidelands Riparian Instrument (required for an area that is now or was formerly flowed by tide)

The trucking contractor will be insured and fully licensed. All vehicles used for hauling the soil/sludge will comply with the Department of Transportation (DOT) Transport of Hazardous Wastes & Substances Regulations. The trucks will be manifested upon loading to identify the source of materials in accordance with 40 CFR 262.

5. OPERATION

5.1 Administration

5.1.1 Operating Personnel

The operations at the site will be under the authority of a site manager that has been appointed by UOP. This manager or his assistant will be on site during all operating hours. The contractor will be required to maintain sufficient operating personnel at the site at all times in order to meet the requirements of the project.

5.1.2 Hours of Operation

In order to maintain a smooth flow of material from the lagoons to the mixing pad and into the rolloff containers it may be required that the contractor operate 24 hours a day. The final operating schedule will be left to the discretion of the excavation contractor.

Excavation activities will be suspended during periods of inclement weather that intefere with the proper mixing and stabilizing process.

5.1.3 Operating Records

A complete and thorough daily written operating log will be maintained by the site manager and contractor. As a minimum, that log will contain the following information:

- A list of visitors to the site,
- A summary of telephone calls incoming and outgoing,
- A summary description of work conducted at the site,
- A description of any variation from the Work Plan,
- A report of significant activities and events such as meetings, site inspections, spills, and emergencies,

- An inventory of all construction materials (e.g. cement kiln dust, backfill) brought to the site including:
  - Time of delivery
  - Transport Company
  - Vehicle I.D. #
  - truck volume
  - load volume
  - load disposition,
- Inventory of all materials (e.g. stabilized hazardous waste) leaving the site.
  - Time of departure
  - Transport Co.
  - Vehicle ID#
  - Truck volume
  - load volume
  - load description
  - manifest #
  - load destination
- Inventory of wastewater removed from the site,
- Copies of hazardous waste manifest,
- Results of all quality assurance tests,
- Results of all inspections, and
- Results of all laboratory field or other analytical tests.

In addition a video tape & color slide photographic record will be maintained of all significant aspects of the work activity throughout the life of the project.

5.1.4 Communications

Telephones will be maintained at the Site Services Area in the offices of the contractor, site manager, and UOP. In addition, two-way radio communications will be maintained between the contractor's supervisor and the personnel operating equipment in the lagoon.

5.1.5 Safety

All personnel will be required to follow all requirements described in the Health and Safety Plan (Section 6).

5.1.6 Personnel and Equipment Shelters

Temporary construction trailers will be provided as personnel and equipment shelters in the Equipment Storage/Site Services Area. These trailers will provide for the following:

- office space for UOP and its contractors,
- first aid station,
- personnel sanitation,
- personnel lounge/lunch room,
- personnel decontamination, and
- equipment storage.

5.1.7 Equipment Requirements

The contractor will provide and maintain in operating condition, sufficient equipment on site in order to implement the excavation program and meet the project deadline.

Major items of dedicated equipment are anticipated to be:

- one backhoe,
- two short bed dump trucks,
- one payloader, and
- one pulvimixer.

Rolloff boxes, tractors, and dump trucks will also be provided as necessary to remove contaminated materials and bring in backfill.

5.2 Method of Operation

5.2.1 Traffic Flow and Control

Waste transportation vehicles will enter the site at the entrance from Route 17 shown on Drawing 1. Proper identification of vehicles will be ascertained by security guards at the gate entrance on the north side of the Equipment Storage/Site Services Area. Unloaded trucks will wait until needed along the access road inside the fenced area. When called for, each truck will enter the Staging Area, unload its rolloff container adjacent to the mixing pad, wait for rolloff box to be loaded, reload the filled box and proceed to the decontamination pad. After being decontaminated, the load will be manifested and pass through an exit security point. The railroad crossing at the decontamination pad will be crossed in accordance with railroad company requirements. Waste transportation vehicles will depart along the access road, as shown in Drawing 1, which intersects the northbound side of Route 17. During periods of heavy traffic on Route 17, traffic direction measures will be implemented for entering and exiting waste transportation vehicles.

5.2.2 Operating Plan

1) Construct decontamination and mixing pads in conjunction with the construction of the staging area, sumps, dikes, roadways, and above ground piping system. Install storage tanks and cement hoppers, electricity, and fencing.
2) Conduct a pilot study to determine the amount of stabilizing material required under actual field excavating and mixing conditions. Repeated trial runs will be made to determine: the optimum amount of stabilizing material to add and the required operating protocol to observe for mixing the

materials. The Paint Filter Liquids Test will be run in the field on the mixed materials. Sludge/soil samples will also be sent to the laboratory to determine their antecedent water contents. The data gathered by the pilot study will be related to the laboratory results to yield a field relationship between water content and quantity of stabilizing material needed to hydrate the free water. This information will also be useful in determining the bulking factor that will be achieved by mixing the cement with the sludge.

3) Upon completion of the pilot study, the removal of the material will proceed as follows:

a. Begin excavation of the material as indicated on Drawing 3 of the plans in the area marked 1. Proceed sequentially, thereafter.

b. Excavate material with a track backhoe and place into short bed dumptrucks. Transport the material to the mixing pad. After depositing the material into the mixing pad, the truck will return to the excavation area for another load.

c. Mix material on the pad with cement kiln dust using a small pulvimixer or other suitable equipment until the material passes the paint filter test.

d. Place stabilized material into roll-off boxes that will be loaded onto trucks.

e. Decontaminate the truck, truck body, tires, and roll-off container on the decontamination pad prior to leaving the site.

f. As the sludge material is excavated from the lagoon, place gravel backfill into the excavation. Maintain a distance of at least 20 feet between the gravel face and the face of the sludge. Proceed with this excavation and

backfilling operation in the sequence outlined on Sheet 2 of the drawings. The intent is to allow excavation and backfilling of the lagoon in such a manner that the excavating equipment can "work" its way across the backfill material.

g. Decontaminate the cab, truck body and tires of trucks transporting gravel to the site prior to leaving the site.

h. As the excavation and backfilling process procedes to the second lagoon, construct a roadway on top of the backfill area for access by the short bed dumptrucks and the gravel filled trucks.

i. Continue the excavation and backfilling process until the sludge material has been removed.

j. Upon completion of backfilling operations, remove contaminated staging area material for proper disposal.

5.2.3 Excavation Sequence

The excavation and backfilling sequence will procede as indicated on Drawing 2. This sequence has been selected in order to allow for the orderly excavation of the sludge material, the backfilling of the gravel to allow access to additional areas, and to eliminate contamination potential of the clean backfill material.

5.2.4 Stabilization

The sludge material will be removed from the lagoons and transported to the mixing pad. Pulvi mixers will be utilized to mix the cement kiln dust with the contaminated material until the combination material passes the EPA paint filter test. Once this has been achieved, the stabilized material will be placed into a roll-off box, loaded onto tractor trailers and transported to a proper disposal facility.

5.2.5 Dewatering

As excavation of the contaminated material progresses, it is anticipated that water originating from precipitation and seepage will appear in the excavation. This water will be managed by portable pumps that will transport the water to the sump water holding tank. Sufficient pumps will be maintained on-site to handle the water seeping into the excavation from the surrounding area and to dewater the excavation rapidly after periods of heavy rain.

5.2.6 Backfilling

The excavation formed by the removal of the contaminated material will be immediately backfilled with a granular material such as crushed rock or gravel. This material has been selected because of its ability to achieve 90% of the maximum compaction as determined by the Standard Proctor Test (ASTM D-698) as it is deposited from dump trucks. This density will be sufficient to allow construction of the access road across the backfilled material and will support the excavating equipment and hauling equipment utilized on the project. The backfill material will be maintained at a depth of at least two feet throughout the lagoon interior. Additional material will be backfilled along the berms to ensure their long term stability.

5.2.7 Decontamination

A decontamination pad will be constructed on the site as indicated on Drawing 2. The pad will be constructed of reinforced concrete as detailed on Drawing 3. Decontamination of the trucks carrying the roll-off containers will be required prior to these trucks leaving the site. Since these trucks are essentially clean upon entering the site and will not leave the

roadway, sufficient decontamination is achieved by a high pressure wash of the wheels, truck body and roll-off container using portable spray equipment. Water for the wash will be available from onsite tank trucks.

The equipment utilized at the site for excavating decontaminated material, hauling the contaminated material to the mixing pad, and hauling gravel for backfilling the excavations will be decontaminated prior to removal from the site. Decontamination of this equipment will also occur on the decontamination pad and will consist of a manual detergent scrub followed by a high pressure wash and steam cleaning.

The decontamination pad will be sloped to allow washwater generated from the decontamination procedure to drain toward a sump and subsequently be pumped to the sump water storage tank. Water will then be pumped from the storage tank to vacuum trucks for transportation to a disposal facility or pumped to an onsite pretreatment facility located in the Equipment Storage/Site Services Area.

5.3 Operating Controls

5.3.1 Erosion

Erosion and flow of sediments offsite are not expected to be problems because the lagoons are enclosed within a berm and a berm of compacted clay will be constructed around the staging area. All flow within the lagoons and staging area is directed to sumps. The staging area cover material will be gravel which is not susceptible to erosion. Staging area entrance and exit roads are on very slight or flat slopes and are unlikely to erode.

Daily inspections of berms and roads will be performed to verify that erosion is not occurring. In the event that berm erosion starts, the berm will be reinforced with soil and gravel in that area. Soil erosion along on-site roads (if it occurs) will be controlled with polypropylene silt fences or with hay bales.

Erosion during construction of the staging area is expected to be minimal due to the short period of time that will be required for site grading before the liner is installed. Hay bales will be available during this construction activity to maintain erosion control.

5.3.2 Fire Protection and Prevention

Appropriate fire extinguishers will be kept in site offices, on trucks and on major pieces of machinery. Fire extinguishers will be on hand wherever flammable and other special hazards are a possibility.

For major fires, the fire department will be contacted by telephone for a response. The fire department telephone number is included on the Notification Checklist in the Health and Safety Plan (Section 6) which will be posted in the site offices.

5.3.3 Site Security

A security service will be provided at the site on a 24-hour-per-day, seven-day-per-week schedule. This security service will be used from the time of site setup until closure procedures are completed.

A security guard will control access to the construction site and register all incoming and outgoing personnel. Access by unauthorized personnel will be prohibited. During site working hours, security guards will coordinate the arrival and departure of waste transportation vehicles. During nonwork hours, the guard will make routine site perimeter inspections.

Security photo identification, specific to the site, will be provided for all regular on site personnel. This identification will be worn by each individual, while the individual is on the site.

Vehicular access to the site will be restricted to authorized vehicles only. Use of site designated parking areas will be restricted to vehicles of UOP, government, contractor, subcontractor, and service personnel assigned to the site and actually on duty.

The security service will be responsible for maintaining a log of security incidents.

All personnel and visitors having access to the site will sign-in and sign-out and a record of all site access will be kept. All approved visitors to the site will be briefed on safety and security, provided with temporary identification and safety equipment, and be escorted throughout their visit. Site visitors will not be permitted to enter active hazardous work areas.

Hazardous Work Areas will be posted at 40 foot intervals, "Warning, Hazardous Work Area, Do Not Enter Unless Authorized," and fenced in the areas shown on Drawing 1.

Sufficient lighting will be provided to ensure effective night security at the site.

5.3.4 Stormwater/Wastewater Management

Stormwater and water generated by decontamination procedures will be collected by staging area sumps and by portable pumps in the lagoons. The water will be transferred to a sumpwater storage tank.

The fate of the collected water is contingent on the types and concentrations of contaminants and on permitting requirements and difficulties. Four alternatives are being considered for disposal of the sump water:

1. Discharge directly to Ackerman's Creek,
2. Discharge, without treatment to the Rutherford, East Rutherford, Carlstadt Joint Meeting (RERCJM) treatment works,

3. Pretreatment, then discharge to the RERCJM treatment works, and
4. Tank truck transportation to an industrial wastewater discharge treatment facility.

The appropriate form of water disposal will emerge through permit applications to the appropriate divisions of the NJDEP, permit application to the RERCJM, cost considerations, and setting of contaminant concentration limits for discharge to the treatment works or to Ackerman's Creek.

5.3.5 Sludge/Soil Manifest and Transport Requirements

Stabilized sludge/soil will be loaded from the mixing pad into 20-cubic-yard dump trailers. The trailers will be lined with 6-mil plastic sheeting and will have bolted gates to prevent spillage during transport. Once loaded, the trailers will be covered with a heavy canvass tarpaulin. Each loaded truck will be decontaminated on the decontamination pad immediately before departure.

The trucks will be manifested upon loading to identify the source of materials in accordance with 40 CFR 262. A numbered "tail gate" seal will be applied to each load of waste material being transported from the site. The seal number for each load will be recorded on the appropriate manifest form. Upon receipt of the load at the disposal facility, the integrity of the seal will be checked and the seal number checked with that recorded on the manifest form. Any discrepancies or broken seals will be reported immediately. The trucking contractor will be insured and fully licensed. All vehicles used for hauling the soil/sludge will comply with the Department of Transportation (DOT) Transport of Hazardous Wastes & Substances Regulations.

5.3.6 Disposal of Stabilized Sludge/Soil

Transported material will be disposed of in a suitable landfill facility. Sample analyses of the sludge/soil will be submitted to the NJDEP, Division of Waste Management, Bureau of Hazardous Waste Classification and Manifest to classify the material. The Bureau's classification will be relied on to determine if the waste material can be disposed of in-state as an industrial waste or if it must be disposed of out-of-state as a hazardous waste.

In order to be suitable for landfill disposal the waste material must be absent of free liquids. The determination of free liquid content will be made by the Paint Filter Liquids Test (EPA Test Method 9095). The waste will be tested by material component (i.e., sludge or meadow mat) to comply with the stipulation that the entire waste mixture fails the test if one component fails. If any component of the waste fails the test, then cement kiln dust will be added to reach a percentage by weight that will pass the test.

The landfill facility may require additional testing prior to accepting the waste material. This testing would demonstrate the material's liquid retaining capacity under typical landfill loading pressures and also demonstrate the material's structural strength against settling.

5.3.7 Contingency Plans

Inspections

The following inspection schedule will be maintained to ensure that spills and leaks that might occur are discovered and corrected:

- Exit Road - once per day

The exit road from the decontamination pad to the junction of U.S. Route 17 will be inspected to ensure that spills have not occurred from improperly sealed truck containers.

- Trucks Carrying Waste Material - each truck as it leaves the decontamination pad.

Each truck will be inspected to ensure that the doors and coverings are properly sealed and that no waste material is on the exterior parts of the vehicle.

- Piping - once per day

All piping originating at the various sumps, feeding to the sump water storage tank and connecting to the wastewater treatment system (if used) will be inspected while in operation to ensure that they are intact and not leaking.

- Lagoon Berms - continuously during excavation near the berms

Indications of slumping of berm soils or breaking of the berms will be monitored as the sole responsibility of one excavation contractor employee.

- Staging Area Berms - once per day

All staging area berms will be inspected to ensure that excavation activities and any potential soil erosion do not affect their runoff-collection function.

Response Actions

The following paragraphs describe the response actions that will be taken in case of spills, leaks, floods or fire.

- Truck Spills Within the Lagoons or Staging Area

Spill of waste materials in the lagoons on areas that have been backfilled will be removed immediately. Any backfill material that is observed to be contaminated will be removed

also. These materials will be brought to the mixing pad and processed in the same manner as other waste materials.

Major spills within the staging area will be removed by front-end loader immediately if the spill interferes with staging area procedures or at the end of daily excavation activities if there is no immenent environmental or safety related concerns associated with the spill.

- Truck Spills Along the Exit Road

Major spills of stabilized material along the exit road between the staging area and Route 17 will result in an immediate halt to excavation activities. Appropriate excavation equipment will be decontaminated at the decontamination pad and brought to the spill site. If the truck that is the source of the spill is not damaged and is capable of transporting the material, it will be refilled with spilled material and any material that is observed to be contaminated from contact with the spilled material. The truck from which the material spilled will be inspected, conditions that caused the spill will be corrected, and the truck will be decontaminated after being refilled before it exits the site. If necessary, an alternate truck will be used to transport the spilled material back to the mixing pad from where it will be loaded onto another truck.

- Pipe Line Leaks

Upon discovery of a leak, all associated sump pumps will be immediately turned off. The leak or break in the pipe will be repaired. Leak testing will be implemented under no flow, full pump head conditions before normal operating conditions resume.

- Flooding Events

There is a very small probability that a hurricane induced storm surge or a very large rainfall could cause the excavation to become inundated. The staged approach of the excavation procedure, as described in Section 5.2.3, will minimize the contact between flood waters and disturbed sludge and meadow mat. If such an unlikely flooding event does occur, excavation activities will be halted and draining of the lagoons will proceed using the sumps provided. Excavation activities will resume after the draining is completed.

- Fires

In order to respond to small fires, fire extinguishers will be stored in the following places:

- In the office trailers located in the Equipment Storage/Site Service Area,
- On each truck, and
- On each major piece of machinery.

For major fires, the fire department will be contacted by telephone for a response.

The fire danger is considered minimal due to the characteristics of the site and the lagoon materials which are moist and do not contain substances at concentrations that are not combustible under ambient conditions.

- Berm Failure

Stockpiles of rip rap, gravel and soil will be stored in the Equipment Storage/Site Service Area. In the event of a berm failure, this material will be transported by backhoe to the failure site as needed to rebuild the berm.

5.3.8 Quality Assurance

This section describes the procedures that will be followed to ensure that the various tasks are completed to the requirements of this Work Plan and subsequent specification documents.

Berm Integrity

The safe limit of excavation for berm stability will be established by the field and laboratory investigation described in Section 2. Assurance that the berms are not collapsing will be made by constant inspection of the berms while the excavating activity is proceeding near the edges of the lagoon interiors. The inspections will be carried out as described in Section 5.3.7. Any evidence of erosion or slumping of berm materials will result in immediate corrective actions. These actions will entail strengthening of the affected berm section and a re-analysis of the distance to which the berms can be excavated.

Horizontal Limit of Excavation

The horizontal limit of excavation will be determined through a combination of field and laboratory investigations (Section 2.5) and the risk assessment process (Section 2.1.3). Once established, the horizontal limit of excavation will be verified through measurements. The planned method for performing the verification is to establish an excavation distance from the crest of the berms to the excavation limit and to measure this distance as the excavation proceeds.

Sludge/Soil Stabilization

The required mixing procedure and sludge/soil - cement kiln dust ratios will be established by field and laboratory analyses (Section 2.4) and the Pilot Study (Section 5.2.2). The

adequacy of the stabilization procedure during the excavation program will be established on a daily basis.

This verification will be done by performing a Paint Filter Liquids Test on a representative stabilized sample from the mixing pad.

Excavation Depth

The excavation depth will be determined through the risk assessment process (Section 2.1.3). The actual depth chosen during this process may be related to a particular material, such as excavation through the meadow mat to the clay layer. In this case, the trench tests (Section 2.2) will help determine an acceptable protocol for identifying the various materials during the excavation process. A UOP representative will use this protocol to monitor the excavation process and verify the adequacy of the excavation depth.

6. HEALTH AND SAFETY PLAN

6.1 Introduction

This health and safety plan applies to on-site consulting personnel and contractor personnel during the conduct of work at the UOP site. This plan details the requirements given in ERT's Hazardous Materials Health and Safety Manual, as they apply specifically to ERT personnel on this project, based upon previously observed conditions at the site. In addition, the on-site contractor will be required to have and implement its own health and safety plan that as a minimum complies with ERT's plan and the OSHA standards regulating hazardous waste operations in 29 CFR 1910.120. The contractor's field supervisor and the ERT Site Health and Safety Officer (HSO) will be responsible for continuous adherence by their respective staffs to the safety procedures during site work at UOP. In no case may work be performed in a manner that conflicts with the intent of or the safety concerns expressed in this plan. Personnel violating safety procedures will be removed from the job.

6.2 Program Organization and Administration

The ERT Site HSO will be either a member of ERT's Corporate Health and Safety Staff assigned to this site work or a member of the ERT field team designated by the ERT Project Manager and working under the direction of the ERT Regional Health and Safety Coordinator. In either case, the ERT Site HSO will coordinate his efforts with the ERT Project Manager. It is the Site HSO's responsibility to perform the air-quality monitoring. The Site HSO will supervise day-to-day execution of the personnel protection program and prohibit improperly prepared personnel from entering or working in site areas designated as contaminated zones. Training, reporting findings, and interaction with project personnel for health and safety matters are also duties of the Site HSO.

6.3 Scope of Work

Work activities at this site will be divided into two phases; the field investigation phase and the remedial action phase. Specific activities performed during the field investigation will be the collection and description of hand augered soil samples and the excavation observation and sampling of test pits. The remedial action will involve the excavation, removal and transport of contaminated soil and sludge from the site.

6.4 Hazard Assessment

Initial

Previous hydrogeologic investigations of the UOP site have determined the presence of volatile organic compounds (VOC), various aromatic and halogenated organic compounds, and heavy metals in the lagoons. Table 6-1 provides a list of organic compounds found at the site in water or soil above 100 ug/L (ppb). The relatively high level of VOC in the sludge and soil in the lagoons could cause workers to be exposed to airborne VOC during soil excavation and removal. Workers also may come into contact with contaminated sludge and soil that may be a skin and eye irritant.

Based on their concentration in the soil, their frequency of occurrence in soil samples, their toxicity and/or their vapor pressure, the compounds listed below have been identified as the VOCs of concern at this site. Accompanying the listing of each VOC is a description of the acute and chronic effects associated with exposure to the substance. The referenced TLV is the American Conference of Governmental Industrial Hygienist's (ACGIH) Threshold Limit Value, the 8-hour time weighted average (TWA) airborne concentration to which nearly all workers may be repeatedly exposed day after day without adverse effect.

TABLE 6-1

ORGANIC COMPOUNDS PRESENT AT CONCENTRATIONS GREATER THAN 100 µg/ℓ IN THE WASTEWATER LAGOONS AT THE ALLIED-SIGNAL UOP SITE, EAST RUTHERFORD, NEW JERSEY

Volatile Organic Compounds

- benzene
- chlorobenzene
- 1,2-Trans-dichloroethylene
- ethylbenzene
- tetrachloroethylene
- toluene
- trichloroethylene
- acetone
- total xylenes

Base/Neutral Compounds

- acenaphthene
- 1,2,4-trichlorobenzene
- 1,2-dichlorobenzene
- 1,3-dichlorobenzene
- 1,4-dichlorobenzene
- fluoranthene
- naphtahlene
- bis(2-ethylhexyl) phthalate
- di-n-butyl phthalate
- benzo(a)anthracene
- benzo(a) pyrene
- 3,4-benzofluoranthene
- benzo(b)fluoranthene
- benzo(k)fluoranthene
- chrysene
- acenaphthylene
- benzo(g,h,i)perylene
- fluorene
- phenathrene
- dibenzo(a,h)anthracene
- indeno(1,2,3-cd)pyrene
- pyrene

Acid Extractable Compounds

- 2-chlorophenol
- phenol

Benzene TLV - 10 ppm

Benzene vapor concentrations in excess of the TLV may produce irritation of the eyes and respiratory tract. Repeated contact with the liquid will produce skin irritation. Acute exposure to high vapor concentrations will produce symptoms of central nervous system depression, chronic overexposure to benzene damages the bone marrow resulting in a depression of the body's blood forming system. Chronic overexposure has also been associated with an increased incidence of leukemia. The odor threshold is reported to be approximately 5 ppm.

Chlorobenzene TLV - 75 ppm

Chlorobenzene liquid is a skin irritant. Vapor concentrations in excess of the TLV may produce irritation of the skin, eyes and respiratory tract and may produce symptoms of central nervous system depression. The odor threshold is approximately 60 ppm.

Ethylbenzene TLV - 100 ppm

Ethylbenzene has toxic properties similar to chlorobenzene. Its threshold of smell is approximately 140 ppm.

Tetrachloroethylene TLV - 50 ppm

Tetrachloroethylene vapor concentrations in excess of the TLV may produce irritation of the eyes, nose and throat, and mild depression of the central nervous system. Prolonged contact with the liquid will produce irritation of the skin. Chronic overexposure may damage the liver. The threshold of smell is approximately 50 ppm.

Trichloroethylene TLV - 50 ppm

Trichloroethylene has toxic properties which are similar to those of tetrachloroethylene. In addition, chronic exposure to trichloroethylene may damage the cardiovascular system, the gastrointestinal system and the kidneys. Trichloroethylene has been shown to be an animal carcinogen. Its threshold of smell is approximately 20 ppm.

Toluene TLV - 100 ppm

Toluene vapor in concentrations in excess of the TLV produces symptoms of central nervous system depression. Repeated or prolonged contact with the skin causes drying and cracking of the skin. The threshold of smell of toluene is approximately 10 ppm. However, olfactory fatigue may occur after a short time.

Xylene TLV - 100 ppm

Xylene vapor in concentrations in excess of the TLV may produce irritation of the eyes, mucous membranes and skin. At high concentrations exposure results in central nervous system depression. Prolonged or repeated contact with the liquid produces irritation, drying and cracking of the skin. Its odor threshold is approximately 200 ppm.

Other low volatile or non-volatile contaminants present at the site in elevated concentrations may also pose potential exposure hazard to on-site workers. Exposure to these substances should be minimized by wearing appropriate protective equipment to eliminate skin contact whenever there will be the possibility of contact with contaminated soil or sludge.

Continuing Hazard Assessment On-Site

Air Monitoring Procedures

An HNu PI-101 photoionization detector (PID), equipped with a 10.2 eV probe will be used to provide semiquantitative data on VOC concentrations in and around the breathing zone of workers. All of the contaminants of concern are detected by the HNu PID. The instrument is to be calibrated in the field prior to each day's use in accordance with ERT's SOP #7315, Operation/Calibration of the HNu Photoionization detector. Air sampling will be conducted by taking and recording periodic readings in the breathing zone of workers collecting hand augered soil samples and in the breathing zone of workers performing, or in the vicinity of, soil excavation or removal.

Action Limits

The action limits in Table 6-2 for the VOC of concern in the lagoons are based on the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) for Benzene, which at 10 parts per million (ppm),has the lowest TLV of the observed compounds.

6.5 Personal Protective Equipment

The levels of protection outlined below are recommended by the USEPA for investigation and cleanup at sites potentially contaminated by hazardous materials. It is anticipated that protection Levels C and D, with possible modifications will be used during this project.

TABLE 6-2

ACTION LIMITS FOR AIR CONTAMINANTS

Limit	Persistent Concentration In The Breathing Zone	Procedure
Lower	10 ppm	Don Air Purifying Respirators
Upper	100 ppm	Stop work and revise Health and Safety Plan

Level A (Highest Level of Protection)

- Open-circuit, pressure-demand, self-contained, breathing apparatus (SCBA)
- Fully encapsulated, chemical resistant unit Safety boots (toe and shank protection), chemically resistant
- Inner and outer gloves, chemically resistant
- Hard hat

Level B

- Self-contained breathing apparatus (SCBA)
- Coveralls or splash suit, chemically resistant
- Safety boots, chemically resistant
- Inner and outer gloves, chemically resistant
- Hard hat

Level C

- Full-face air-purifying respirator or half-mask air purifying respirator with safety glasses or goggles
- Tyvek coveralls
- Safety boots, chemically resistant
- Inner and outer gloves, chemically resistant
- Hard hat

Level D (Lowest Level of Protection)

- Coveralls
- Gloves, chemically resistant
- Rubber boots
- Goggles or safety glasses
- Hard hat

Personal protective equipment will be donned, as necessary, based on the hazards encountered. Described below is the specific personal protective equipment to be utilized during this project and the conditions requiring its use.

Respiratory Protection

Air purifying respirators (MSHA/NIOSH approved), equipped with combination HEPA/organic vapor cartridges, must be donned when VOC concentrations in the breathing zone, as measured by the PID, are sustained above the lower action limit of 10 ppm. If breathing zone VOC concentrations are sustained above the upper action limit of 100 ppm (based on a protection factor of 10 for a half mask air purifying respirator). Work in the affected area will be suspended until the safety plan has been revised to include the use of self-contained breathing apparatus, or concentrations have been reduced to below 100 ppm.

Protective Clothing

Tyvek coveralls will be worn by all site personnel in the contaminated zone and all others who may come in contact with contaminated soil; polyethylene coated or Saranex laminated Tyvek will be used if the soil contains a significant liquid content. Nitrile gloves with PVC liners for all personnel who may contact contaminated soil. Impermeable rubber work boots for all site work. If conditions become sloppy, work clothing is to be taped up at the wrist and ankle seams to prevent liquid from entering and workers are to be equipped with faceshields.

6.6 Health Status

All on-site workers are required to be regular participants in a medical surveillance problem which meets the requirements specified in the OSHA Standards Regulating

Hazardous Waste Operations in 29 CFR 1910.120. Any employee who develops a lost time illness or injury will notify the Health and Safety Officer, file an injury/illness report form and will be re-examined by a physician. The physician must certify that the employee is fit to return to work before employment on-site can continue. In addition, the Health and Safety Manager or Health and Safety Officer can request additional medical testing if an abnormal site exposure occurs. A statement of the employee's health will be maintained by the ERT Health and Safety Manager.

6.7 Health and Safety Training

The Health and Safety Officer will train all ERT personnel prior to their working on the site. Training will include:

- Requirements for employees to have received the baseline medical examination within one year of on-site work.
- Requirements for and use of respirators and personal protection equipment.
- Cautions regarding the potential for trench collapse.
- Required personal hygiene practices.
- Requirements for employees to work in pairs.
- Proper material handling.
- Proper sampling procedures.
- Maintenance of safety equipment.
- Effective response to any emergency.
- Responses to fires and explosions.
- Emergency procedures (e.g., in the event of a trench collapse).
- Hazard zones.
- Decontamination methods.
- General safety precautions.

A copy of the Standard Safety Procedures (Table 6-3) will be given to each worker. Training will be documented by the Health and Safety Officer.

6.8 Decontamination

Equipment decontamination will be conducted in accordance with procedures identified in Section 5.2.7 of this Work Plan. Personnel decontamination will be conducted using the following procedures:

Zones will be established in the vicinity of augering or excavation sites as follows:

Exclusion Zone: (Lagoons and staging area, and within 30 ft of borehole, trench or excavation)

- No eating, drinking or smoking
- Personnel dressed in suit, boots and gloves (and respirators if field monitoring indicates the need).

Contaminant Reduction Zone: (adjacent to Exclusion Zone)

- Area used for decontamination
- Wash water and eye wash
- Drum for trash and disposable clothing
- No eating, drinking or smoking

Clean Zone:

- Storage of clean equipment
- Area of unrestricted access for site personnel and authorized visitors
- Eating or drinking allowed

TABLE 6-3

STANDARD SAFETY PROCEDURES

UOP SITE

- Employees are required to have a baseline medical examination within one year prior to on-site activity.
- Employees are required to work in pairs.
- Wash face and hands prior to eating, smoking, or leaving the site.
- No smoking or eating is allowed in the exclusion zone or in the contaminant reduction zone.
- Wearing of contact lenses is not permitted in the work area.
- Contaminated material (e.g., Tyvek coveralls) must be properly disposed of before leaving the site.
- The walls of all trenches or excavations greater than four feet in depth must be properly stabilized before allowing personnel to enter.
- Employees are required to follow the specific health and safety procedures established for this site.

All personnel working in the Exclusion Zone will be required to pass through the Contaminant Reduction Zone before entering the Clean Zone. In the Contaminant Reduction Zone, personnel will remove clothing and equipment, starting with the most likely contaminated item: boots, followed by gloves, coveralls and respirators. Equipment used in the Exclusion Zone will be left in the Contaminant Reduction Zone until it is decontaminated. Personnel will be required to wash their face and hands thoroughly before leaving the Contaminant Reduction Zone. Any direct skin contact with contaminated materials will require removal of clothing and cleaning with soap and water.

Disposable contaminated materials (rinse water, Tyvek coveralls, PVC gloves, wipes etc.) will be placed in 55-gallon drums and stored on site while arrangements are made for disposal. Respirators will be cleaned and disinfected after each day of use. The facepiece (with cartridge removed) will be washed in a hypochlorite (or equivalent) disinfecting solution, rinsed in warm water and air dried in a clean place. Drilling and sampling equipment will be cleaned by steam cleaning or washing with a mixture of MICRO™ cleaning solution followed by a rinse with potable water. Sampling equipment will have a final distilled water rinse. The use of volatile organic solvents (for example, hexane, acetone) as cleaners can lead to the contamination of samples as well as posing the threat of fire or explosion, and for these reasons will not be utilized in the decon line.

All equipment will be thoroughly washed with detergent and potable water and subsequently steam cleaning before leaving the UOP site.

6.9. Emergency Procedures

The Health and Safety Plan for the UOP site has been established to allow site operations to be conducted without adverse impact on worker health and safety. In addition, supplementary emergency response procedures have been developed to cover extraordinary conditions at the site.

General

All accidents and unusual events will be dealt with in a manner to minimize a continued health risk to site workers. In the event that an accident or other unusual event occurs, the following procedures will be followed:

- Those ERT employees closest to site of an accident or event should administer first aid or other appropriate initial action. When rendering assistance, the first aiders should not place themselves in a situation of unacceptable risk. In the event that a worker is caught in a trench collapse, emergency assistance should be called immediately.
- Report all accidents/unusual events to the ERT Site HSO and the ERT Project Manager. The Site HSO is responsible for conducting the emergency response in an efficient, rapid, and safe manner. The site HSO or the designated supervisor will decide if off-site assistance and/or medical treatment is required and arrange for assistance.
- ERT employees involved in an accident or event should conduct themselves in a mature, calm manner in the event of an accident/unusual event, to avoid spreading the danger to other workers.

The Site HSO will have a first-aid kit and a portable eyewash kit and a fire extinguisher available at one or more locations on site for emergencies and will inform all workers of the locations of these materials.

Responses to Specific Situations

Emergency procedures for specific situations are given in the following paragraphs.

Worker Injury

If an employee in a contaminated area is physically injured, follow Red Cross first-aid procedures. Depending on the severity of the injury, seek emergency medical response. If an excavation collapses and a worker is caught, call for emergency assistance immediately. If the worker is in no immediate danger, do not attempt to move him, as internal injuries could be worsened. If the employee must be moved, take the person to the edge of the work area, then remove the person's contaminated clothing (if any), administer emergency first-aid, and await transport to a local emergency medical facility.

If the injury to the worker is chemical in nature (e.g., overexposure), the following first-aid procedures are to be instituted:

- Eye Exposure - If contaminated solids or liquids get into the eyes, wash eyes immediately using large amounts of water and lifting the lower and upper lid occasionally. Obtain medical attention immediately.
- Skin Exposure - If contaminated solids or liquids get on the skin, promptly wash the contaminated skin using soap or mild detergent and water. Obtain medical attention immediately when exposed to concentrated solids or liquids.
- Inhalation - If a person inhales large amounts of a toxic vapor, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Obtain medical attention as soon as possible.
- Swallowing - When contaminated solids or liquids have been swallowed, the Poison Control Center will be contacted and their recommended procedures followed.

Notification Checklist

The names and phone numbers of all personnel and agencies that could be involved in emergency responses have been determined. The list will be posted at several prominent locations at the site. Table 6-4 provides the notification checklist for use at the site.

Documentation

The Site HSO will provide a report to the ERT Project Manager and Corporate Health and Safety Coordinator containing the following information regarding any incidents implicating health and safety concerns:

- The event (including date and time) that necessitated the notification and the basis for that decision.
- Date, time, and names of all persons/agencies notified and their response.
- Resolution of the incident (including duration) and the method/corrective action involved.

This report will be submitted by the Site HSO to the Project Manager within five working days of the resolution of the event.

Evacuation Plan

Although very unlikely, it is possible that a site emergency could necessitate evacuating all personnel from the site. If such a situation arises, both the Site HSO and Field Coordinator will be notified of this event and the appropriate signal given for site evacuation. It is the responsibility of these individuals to evacuate personnel in a calm, controlled fashion.

TABLE 6-4

NOTIFICATION CHECKLIST

UOP SITE

In the event of an extraordinary event that might be damaging to personnel or adjacent property, immediate notification of the proper emergency service will be required. The proper emergency service is determined by the nature of the emergency. The nearest telephone is located in the on-site office trailer.

EMERGENCY NOTIFICATION

East Rutherford Fire Department	(201)438-0165
East Rutherford Ambulance	(201)438-0165
East Rutherford Police Department	(201)438-0165
Riverside General Hospital, Secaucus	(201)392-3100
Poison Control Center	(800)382-9097
NJDEP Project coordinator	_____

After notification of the proper emergency service or services, proceed to deal with the emergency at hand.

PROCEDURE FOR REPORTING INCIDENTS:

IMMEDIATELY CALL:	Michael Worthy (ERT)	(617)369-8910
or	William Duvel (ERT)	(617)369-8910
or	Kevin Powers (ERT)	(617)369-8910

All available vehicles will be used in the evacuation. All personnel will exit the site and be taken to a rendezvous point at a location selected by the Site HSO. Selection of the redezvous location will be dependent on wind direction, severity and type of incident. Evacuation will be conducted without personell or equipment decontamination. Decontamination will be conducted after the emergency has been secured. All personnel will act in a manner to minimize exposure to hazardous materials during and after the evacuation. Local authorities will be notified of the evacuation.

The Field coordinator's log of on-site personnel (Field Notebook) will be used to account for all individuals. If someone is missing, the Site HSO will alert emergency personnel. Control of personnel at the rendezvous point is the responsibility of the Field Coordinator or designated assistant.

7. CLOSURE

Upon completion of the removal of contaminated material from the lagoons closure operations will begin.

7.1 Closure Sequence

The sequence of closure for the staging area will be as follows:

1. Remove the lagoon access road, gravel and liner material. This material will be placed in lined roll off containers and will be disposed in the same manner as was the sludge/soil.
2. After removal of the lagoon access road, removal of the staging area equipment and constructed features can begin. The removal of the material from the staging area should begin in the Northern portion of the staging area and proceed to the South towards the decontamination pad. All gravel and liner material will be placed in lined rolloff containers and disposed of.
3. The mixing pad will be "broken up" and disposed of in the same manner. As trucks leave the site, they will be decontaminated at the decon pad.
4. After the removal of the gravel, the HDPE liner and the mixing pad, the sumpwater storage tank, cement-hopper and related piping from the mixing pad and field ump will be decontaminated on the decontamination pad. Washwater will be routed to a tank truck parked outside of the staging area.
5. After removal of all fixtures and roadway material, the decontamination pad will be "broken up", loaded into lined rolloff containers and disposed of.

7.2 Final Grade and Cover

After removal of all gravel, HDPE liner, geomembrane, supporting fixtures and equipment from the staging area, the area will be graded for positive drainage and seeded to provide vegetation.

7.3 Final Inspection

After completion of all earthwork and seeding operations the area will be inspected to verify that all contaminated materials has been removed and proper grading has been provided.

8. SCHEDULE

Figure 8-1 illustrates the estimated schedule for the remedial action. The time lengths for some activities such as the NJDEP reviews and approvals and the UOP revisions to the RA Work Plan are taken directly from Figure 2 of NJDEP's August 13, 1986 letter to UOP. Support activities such as soil borings and analyses are allotted time spans consistent with the time given other investigations at the site. It is anticipated that the RA Work Plan will go through one more review and revision cycle, each lasting twenty days, before final NJDEP approval is granted.

Table 8-1 depicts a schedule relative to calendar dates which assumes each activity takes exactly its allotted time. Under this schedule, the field investigations will begin in May 1987, followed by laboratory analyses, the Risk Assessment and the contractor selection process. The Risk Assessment findings will be submitted to the NJDEP and it is anticipated that the submittal will be followed by a review, revision and approval cycle. Remedial Action implementation will begin in March 1988: following the winter season.

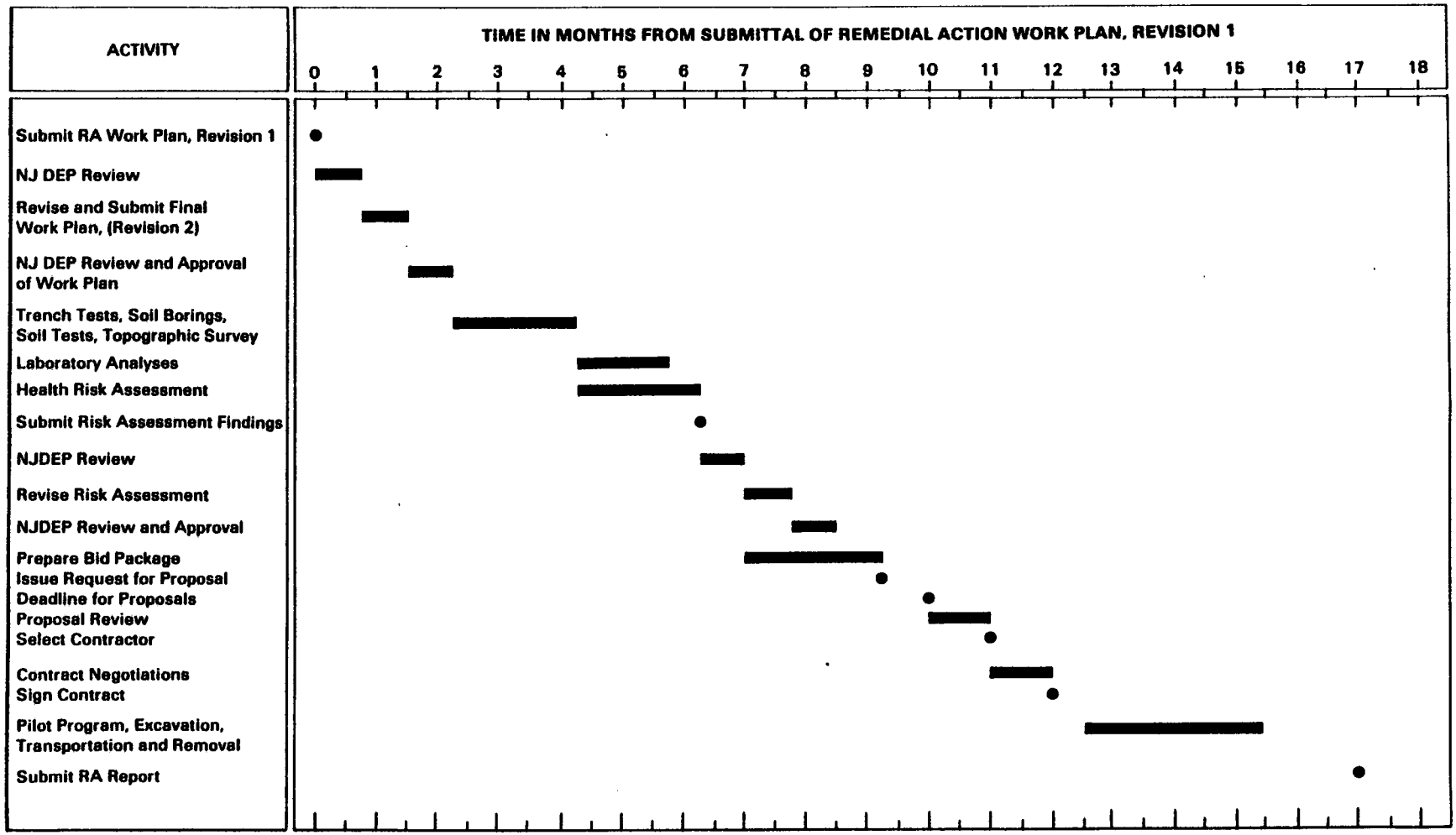


Figure 8-1 Remedial Action Schedule

TABLE 8-1

ANTICIPATED SCHEDULE*

March 1, 1987	Submit Work Plan, Revision 1
March 2 - March 21	NJDEP Review
March 22 - April 13	Revise and Submit Final Work Plan, (Revision 2)
April 14 - May 5	NJDEP Review and Approval
May 6 - July 6	Trench Tests, Soil Borings, Soil Tests, Topographic Survey
July 7 - August 21	Laboratory Analyses
July 7 - September 7	Health Risk Assessment
September 7	Submit Risk Assessment Findings
September 8 - September 28	NJDEP Review
September 29 - October 19	Revise Risk Assessment
October 20 - November 9	NJDEP Review and Approval
October 1 - November 30	Prepare Bid Package
December 1	Issue Request for Proposal
December 22	Deadline for Proposals
December 23 - January 23	Proposal Review
January 24	Select Contractor
January 25 - February 25	Contract Negotiations
March 1	Sign Contract
March 15 - June 15	Pilot Program, Excavation, Transportation and Disposal
July 31	Submit RA Report

*This table presents a hypothetical schedule that optimistically assumes that each activity will neither exceed nor fall below the allotted length of time.

9. ESTIMATED COSTS

The estimated costs for excavation and disposal of the wastewater lagoon sludge/soil are presented in Table 9-1. The assumptions and unit prices that are used in developing these costs are as follows:

- Total Waste Volume;

  1. The total waste volume is 3670 cubic yards based on a combined lagoons surface area of 24,800 ft^2 and an average excavation depth of 4 ft. This volume assumes excavation vertically to the clay layer and horizontally to the toe of the berms.
  2. The excavated volume of materials is 4400 cubic yards based on an assumed 20 percent expansion factor.

- Excavation Costs;

  1. The excavation costs are the sum of several component activities: utilities installation, staging area preparation, equipment mobilization, sump installation and operation, mixing of stabilizing material, excavation and loading of stabilized material; and removal and decontamination of staging area base material and equipment.

- Sump Water Disposal Costs;

  1. The sump water disposal costs are for discharge of water collected in the sumps to the sanitary sewer and eventual processing at the POTW Pre-treatment is not considered in the cost analysis.

TABLE 9-1

ESTIMATED COSTS OF EXCAVATION, TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIALS IN WASTEWATER LAGOONS, AREA 3, UOP SITE

Description		Cost in Thousands of Dollars
Excavation		190
Sump Water Disposal		20
Transportation		323
Landfill Disposal Fee		525
	Subtotal	1,058
Engineering (15%)		159
Contingency (10%)		106
	Total	1,323

2. The costs include installation of discharge piping to the sanitary sewer and POTW disposal fees.

- Transportation Costs;

1. Transportation is assumed to be provided by 20-cubic yard dump trailers at a rate of $3.50 per loaded mile.
2. The worst case disposal option; out-of-state disposal of contaminated material, is assumed. Therefore, disposal is assumed to be at a landfill in the Niagra Falls, New York area which is about 380 road miles from the UOP Site in East Rutherford.
3. The soil is assumed to have a unit weight of 1.3 tons per cubic yard in place.
4. Cement kiln dust (stabilizing material) is assumed to be required at a rate of 10 percent by weight of sludge/soil.

- Landfill Disposal Costs;

1. A unit price of $100 per ton, which is a recent quote from a hazardous waste landfill, is used.
2. Assumptions 2 and 3 under Transportation Costs also apply here.

APPENDIX A

SAMPLING METHODS AND QUALITY ASSURANCE PROCEDURES

A1, SAMPLING PROCEDURES

A1.1 Boring Samples

The procedure described below for collecting soil samples was developed with the knowledge that access to the sampling locations by drilling equipment would be extremely difficult and hazardous. It is anticipated that the proposed plan for sampling by hand methods is achievable based on current knowledge of the berm conditions. However, circumstances may arise in the field that will require some modifications to the plan. Deviations from this plan will be documented in the field and this documentation will be provided to the NJDEP. The proposed procedure is described as follows:

1. Drive a metal stake into the crest of the berm and label the stake with the transect number. (The ground surface elevation at the stake and the location of the stake will be surveyed at a later time and the location will be included on the lagoon topographic map.)
2. Record the transect number and designate a location number for each boring along the transect.
3. Place the first boring at the berm crest adjacent to the metal stake. The locations of the remaining borings along the transect are measured both horizontally and vertically from the metal stake using a hand level, surveyor's rod and measuring tape.
4. Determine the difference in ground surface elevations between the boring location and the interior of the lagoon using the surveyor's rod and hand level.
5. Determine the required depth in the boring to reach an elevation that is equivalent to the elevation of the top of the sludge inside the lagoon.

6. Record all measurements and calculations in the field log book for each boring.
7. Remove soil to the depth described in Step 5 above using a bucket auger.
8. Obtain a sample by advancing a stainless steel core barrel (if soil conditions permit) or a bucket auger one foot into the bottom of the bore hole.
9. Recover the core barrel or bucket auger and remove sample. For the bucket auger, remove any loose soil from the top of the core, as this may include displaced material that does not represent sampled depth.
10. Place the sample into a 4 ounce, amber sample jar.
11. Identify the sample container in terms of location, depth, date and time, and enter this information in the field notebook.
12. Place the sample on ice and out of direct sunlight.
13. Describe in the field notebook the sediments found in each sample.
14. Decontaminate the sampling equipment in accordance with the decontamination procedures (Section A.2).
15. Re-assemble the sampling equipment for the next sample.
16. Remove soil from the boring in six-inch increments using the bucket auger until meadow mat is encountered.
17. a. When meadow mat is encountered, obtain a sample in accordance with steps 7 through 14 above.
    b. If meadow mat is not encountered within three feet, then obtain a sample in accordance with steps 7 through 14 and discontinue any further sampling in this boring.
18. After obtaining the meadow mat sample, continue removing the remaining thickness of meadow mat in six-inch increments until clay is encountered.

19. When clay is encountered, obtain a sample in accordance with steps 7 through 14 above.

Trench Test Samples

Trench test samples will be collected in sufficient quantity to perform soil strength tests and paint filter liquids tests. Samples of each type of stratum (i.e., sludge, meadow mat and clay) will be collected. The sampling procedure in the lagoon interior where samples will be collected for stabilization tests is described as follows:

1. Drive a metal stake at a three-foot diagonal offset from each corner of the rectangular area to be excavated. Determine and identification number for the trench and enter the location and trench number and location in the field notebook, along with the date and time. (The location of the stakes will be surveyed at a later time and the trench position will be included on the lagoon topographic map.)
2. Remove the sludge layer and deposit in a pile using a track-mounted backhoe.
3. Collect a representative sample from the pile using a shovel and place in an appropriate container.
4. Label the sample container with the trench number, location and depth range represented.
5. Remove the meadow mat layer and deposit in a pile
6. Repeat steps 3 and 4.
7. Remove two feet of clay layer and deposit in a pile.
8. Repeat steps 3 and 4.

The sampling procedures for trenches that extend into the berms and from which samples will be collected for soil strength and permeability tests is described as follows:

1. Drive a metal stake at a three-foot diagonal offset from each corner of the rectangular area to be excavated. Determine and identification number for the trench and enter the location and trench number and location in the field notebook, along with the date and time. (The location of the stakes will be surveyed at a later time and the trench position will be included on the lagoon topographic map.)
2. Drive a Shelby into the berm at the highest elevation within the trench boundary, (use the backhoe to drive the Shelby Tube, if necessary).
3. Using the backhoe, pull on the hoisting plug head to remove the Shelby Tube.
4. Seal the ends of the Shelby Tube.
5. Excavate the trench to the limit of the Shelby Tube penetration.
6. Drive another Shelby Tube into the bottom of the trench, remove it and seal the ends.
7. Again excavate the trench to the limit of the Shelby Tube penetration.
8. Repeat the steps of driving the Shelby tube, collecting the tube and excavating to th penetration limit until the excavation has penetrated to a depth that is equivalent to two feet into the clay layer in the lagoon interiors.

The trenches will be left open, under supervision, during the day to observe water table conditions. The trenches will be backfilled with the excavated material prior to leaving the site.

A2. QUALITY ASSURANCE PROCEDURES

This section discusses the quality assurance requirements during the collection and shipping of samples. Specifically these are requirements for field duplicates, field blanks, trip blanks, decontamination, and shipping and chain-of-custody procedures. These procedures apply to samples that will undergo volatile organics analysis.

A2.1 Field Duplicates

One out of every 20 soil samples will be collected and sampled in duplicate for the purpose of determining the repeatability of the sampling and analysis procedures. A duplicate sample will be collected by spooning soil from one side for the first sample and then the opposite for the duplicate sample along the entire length of a selected extruded core segment. Soil will be removed from the core and placed directly in the two sample containers to minimize the loss of volatile organics. Each duplicate sample will be logged, labeled, and in every way treated as an ordinary sample. Duplicates will not be labeled as such on either the labels or the chain-of-custody forms. Field sample logs will indicate which samples are duplicates. Duplicate sampling should only be performed at sampling sites where quantifyable concentrations of the materials to be analyzed are expected to occur.

A2.2 Field Blanks

Once each day of soil sampling, at least one field blank will be collected to assess the effectiveness of sampling equipment decontamination procedures and detect any sample contamination. For this purpose a supply of laboratory reagent water will be provided to the field sampling team by the laboratory that will analyze the samples. Field blanks will be collected after equipment decontamination and immediately

before the collection of a soil sample by pouring reagent water into the sampling device and then transferring it into a sample container. The container will then be sealed, labeled as a field blank, logged on the chain-of-custody form and placed in the cooler with the sediment samples. The event will be recorded in the field logbook.

A2.3 Trip Blanks

At the beginning of the sampling round, the analytical laboratory will provide coolers with empty sample containers to the sampling team. Each cooler will contain a trip blank consisting of a sealed, labeled sample container filled with laboratory reagent water. The trip blanks will remain sealed, in the coolers until the coolers are returned to the laboratory and the samples are logged in. The trip blanks will be analyzed to determine whether volatile organics may have migrated from sample to sample during shipment.

A2.4 Decontamination

1. Except as noted below, all field sampling equipment will be laboratory cleaned, wrapped, and dedicated to a particular sampling point. Alternatively, clean, unused disposable field sampling equipment will be utilized,
2. Field cleaning of any larger equipment used to obtain soil cores will consist of a manual scrubbing to remove foreign material and steam cleaning inside and out until all traces of oil and grease are removed. Cleaned equipment will be stored to prevent accidental recontamination.
3. Smaller equipment which may come in contact with the sample (for example, soil coring devices such as split spoons, core barrels or bucket augers) will be field cleaned by the following procedure:

- Rinse all loose materials off with water. Use Alconox solution and scrub brush if necessary,
- Rinse with tap water
- Rinse with deionized water
- Rinse with pesticide grade acetone
- Air dry, or purge with compressed nitrogen to dry quickly
- Rinse with deionized water

The deionized water supply used for field blanks will not be used for equipment decontamination. Deionized water suitable for this purpose is commercially available.

A2.5 Shipping and Chain-of-Custody Procedures

Each cooler of soil samples will be accompanied by a four part chain-of-custody form (Figure A-1) identifying its contents. All of the heading information on the form should be filled out at the beginning of sampling activities.

As each sediment sample is collected and placed in the cooler, its sample number and type, the date and time it was collected and the analyses to be performed are entered on the form.

Each sample jar will be placed in an individual bubble wrap bag before being placed in the cooler. When the cooler is filled, additional packing material (bubble wrap and/or vermiculite) will be placed in the cooler so that the contents are snug.

Before the cooler is sealed for shipment, two pieces of chain-of-custody tape will be selected and their serial numbers will be entered on the chain-of-custody form. The person packaging the samples will sign the "relinquished by" box and enter the date and time. The back copy of the form will be separated and will remain with the field records. The original and remaining copy will be placed inside a waterproof bag placed in the cooler with the samples.

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location	ANALYSES
Project No.	Field Logbook No.	
Sampler: (*Signature*)	Chain of Custody Tape No.	

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample							REMARKS

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*)	Date	Time
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ERT

Nº 10978

1974-3-84

Figure A-1 Chain of Custody

The cooler will then be sealed with strapping tape. The two pieces of chain-of-custody tape will be signed and dated by the packer and affixed across the strapping tape seal in diametrically opposite positions. The chain-of-custody tape will be covered with a single layer of translucent strapping tape. Samples will be shipped to ERCO by Federal Express Overnight Service within 2 days.

When the cooler is received at the laboratory, the laboratory sample custodian will examine the chain-of-custody tape to verify that it is intact. The custodian will then open the cooler, retrieve the chain-of-custody form and check to see that the serial numbers of the chain-of-costody tapes just broken agree with those on the form. The custodian will then compare the contents of the cooler to the list on the chain-of-custody form, and will inspect the sample jars for damage. If any samples are damaged, they will be identified by making a note in the "remarks" section of the form. The custodian will sign and date the chain-of-custody form in the "Received for Laboratory" box. The copy will be separated and returned to the sender for confirmation of receipt.

A2.6 Sample Holding Times

The following sample holding times will be observed;

- Shipment of volatile organics: maximum of 2 days,
- Organics Extraction: Maximum of 7 days, and
- Organics Analysis: Maximum of 30 days from extraction.

SITE PLAN
SCALE: 1"= 50'

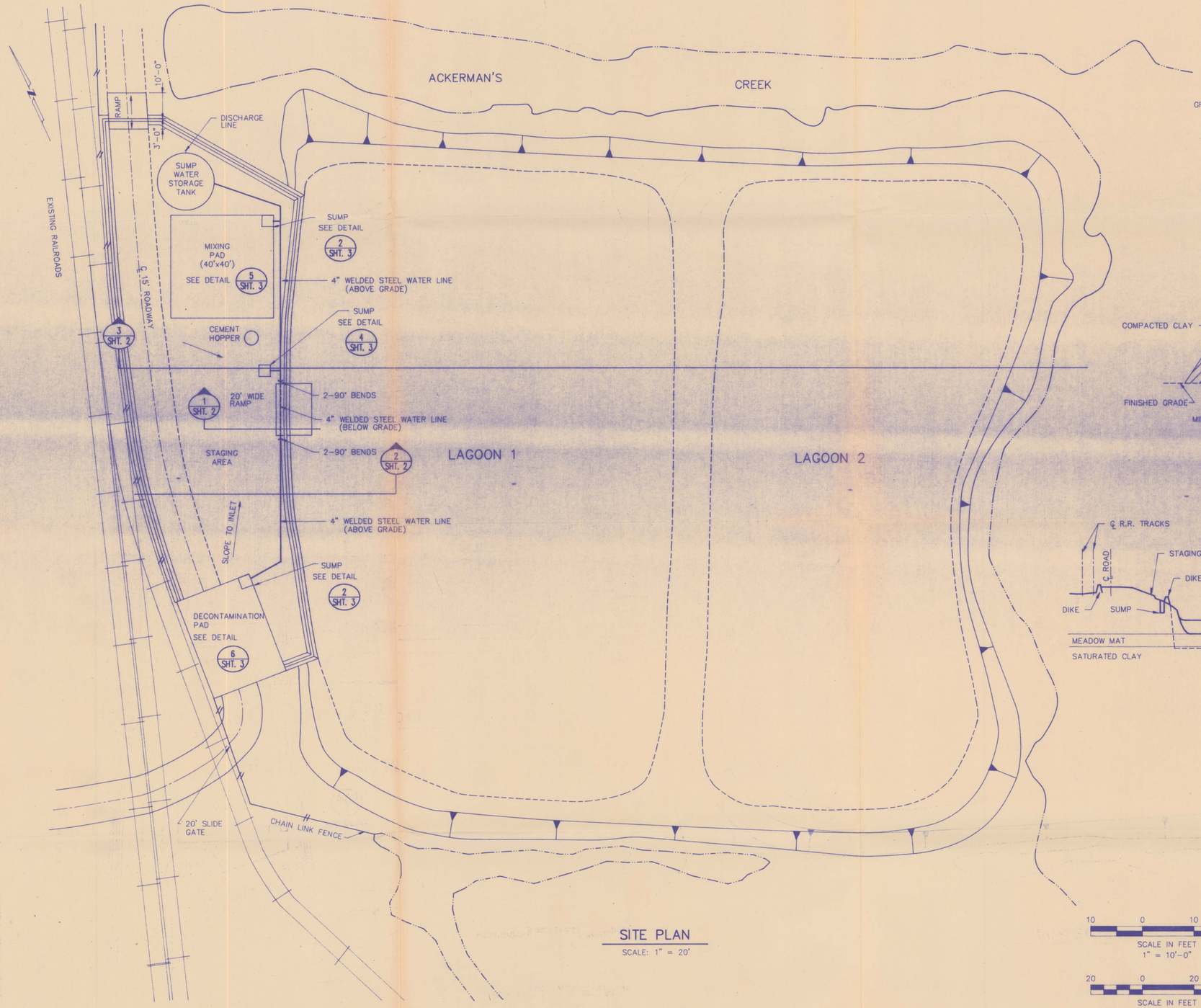
NO.	REVISIONS	BY	CKD.	APP.	DATE

ERT 696 VIRGINIA ROAD, CONCORD, MASSACHUSETTS 01742

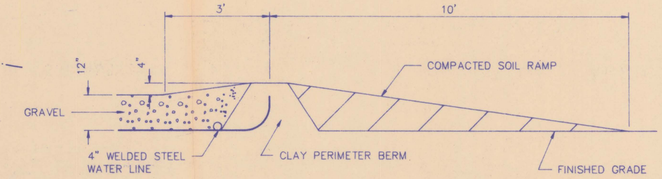
SITE PLAN
WASTEWATER LAGOON EXCAVATION PROGRAM
UOP SITE EAST RUTHERFORD, N.J.

WILLIAM A. DUVEL, Professional Engineer — N.J. LIC. NO. GE 28465

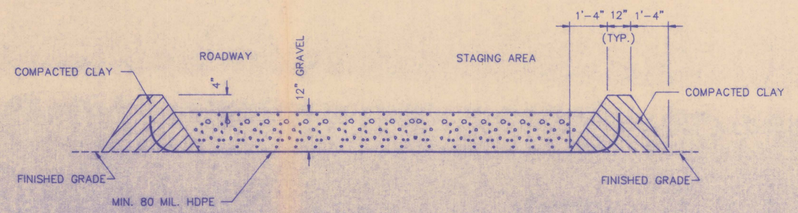
DRAWN:	N.L.JONES	DATE:	2/20/87
CHECKED:		SCALE:	NOTED
PROJECT NO.	E197-310	DRAWING NO:	1



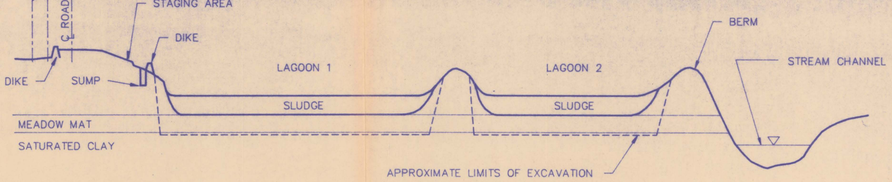
SITE PLAN
SCALE: 1" = 20'



ACCESS RAMP DETAIL 1
SCALE: 1/2"= 1'-0"



ROADWAY AND STAGING AREA CROSS SECTION 2
N.T.S.



LAGOON CROSS SECTION 3
APPROX. 1"= 40' HOR
APPROX. 1"= 10' VERT.

NOTE:
CHECK VALVE SHALL BE INSTALLED AFTER EACH SUMP PUMP AND UPSTREAM OF EACH PIPE INTERSECTION.

10 0 10 20
SCALE IN FEET
1" = 10'-0"

20 0 20 40
SCALE IN FEET
1" = 20'-0"

40 0 40 80
SCALE IN FEET
1" = 40'-0"

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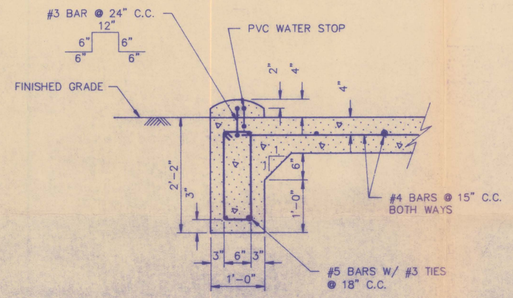
STAGING AREA PLAN
WASTEWATER LAGOON EXCAVATION PROGRAM
UOP SITE EAST RUTHERFORD, N.J.

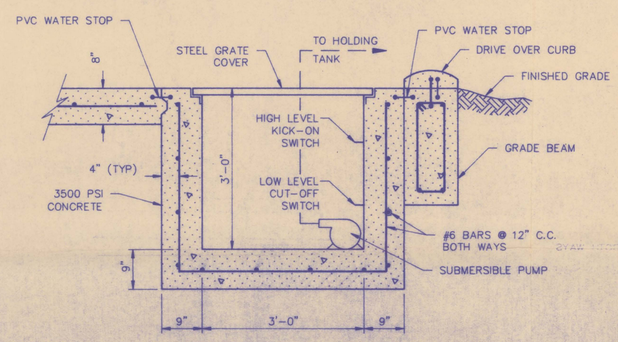
WILLIAM A. DUVEL, Professional Engineer — N.J. LIC. NO. GE 28465

DRAWN: N.L.J.	DATE: 2-20-87
CHECKED: S.D.D.	SCALE: AS NOTED
PROJECT NO. E197-310	DRAWING NO: 2



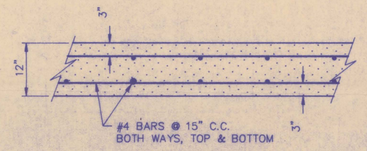
SECTION A–A
TYPICAL DRIVE OVER CURB AND GRADE BEAM (1)

SCALE: 3/4" = 1'-0"



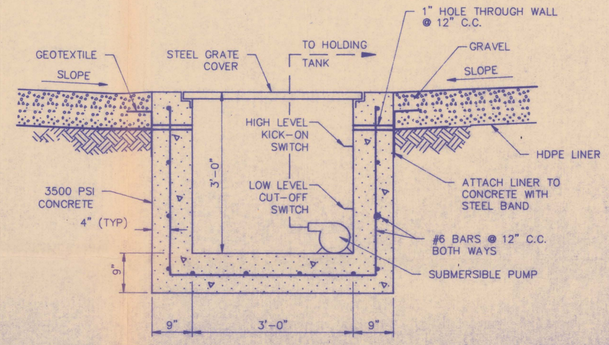
SECTION B–B
SUMP DETAIL (2)

SCALE: 3/4" = 1'-0"



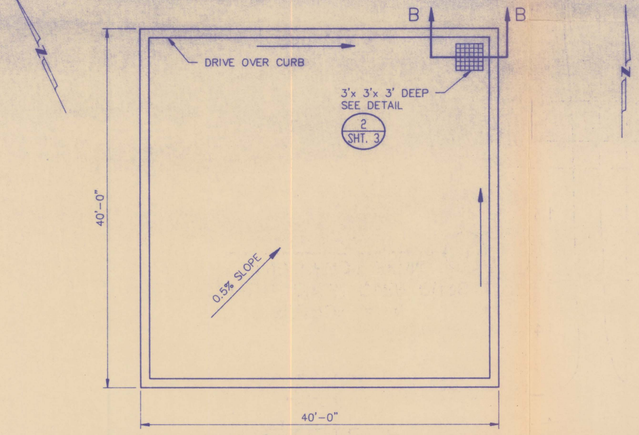
MIXING PAD SLAB DETAIL (3)

SCALE: 3/4" = 1'-0"



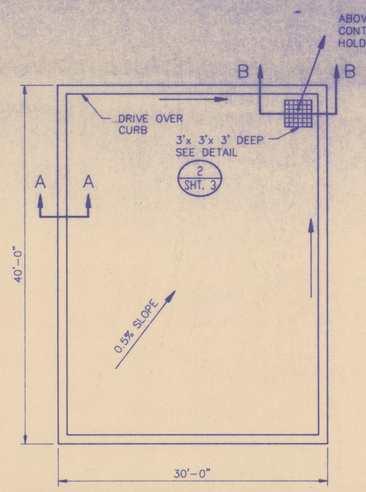
FIELD SUMP DETAIL (4)

SCALE: 3/4" = 1'-0"



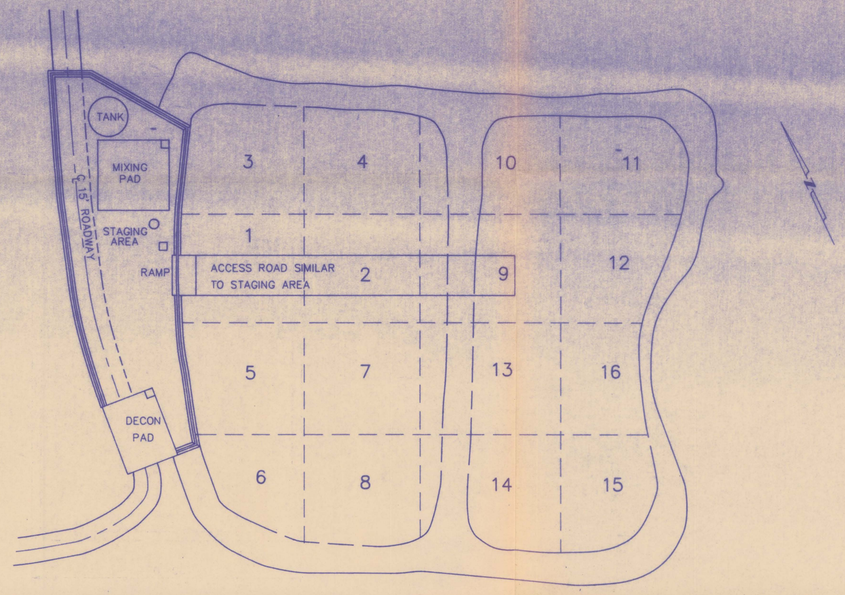
MIXING PAD PLAN (5)

SCALE: 1/8" = 1'-0"



DECONTAMINATION PAD PLAN (6)

SCALE: 1/8" = 1'-0"



STABILIZATION AND BACKFILL SCHEDULE (7)

1" = 40'-0"

40 0 40 80
SCALE IN FEET
1" = 40'-0"

8 0 8 16
SCALE IN FEET
1/8" = 1'-0"

2 0 2
SCALE IN FEET
3/4" = 1'-0"

NO.	REVISIONS	BY	CKD.	APP.	DATE

ERT. 696 VIRGINIA ROAD, CONCORD, MASSACHUSETTS 01742

PLANS AND DETAILS
WASTEWATER LAGOON EXCAVATION PROGRAM
UOP SITE EAST RUTHERFORD, N.J.

WILLIAM A. DUVEL, Professional Engineer — N.J. LIC. NO. GE 28465

DRAWN: L.MARTIN	DATE: 2/20/87		
CHECKED: mcw	SCALE: NOTED		
PROJECT NO. E197-310	DRAWING NO: 3		

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